**Statement of**
**Anne E. Kinsinger**
**Western Regional Biologist**
**U.S. Geological Survey**
**before the**
**U.S. House of Representatives Committee on Resources**
**Subcommittee on Forests and Forest Health**
**Field hearing on**
**"Recovering from the Fires: Restoring and Protecting Communities, Water, Wildlife and Forests in Southern California"**

**December 5, 2003**
**Lake Arrowhead, San Bernardino County, California**

Mr. Chairman and Members of the Subcommittee thank you for the opportunity to present this testimony regarding "Recovering from the Fires: Restoring and Protecting Communities, Water, Wildlife and Forests in Southern California." The USGS conducts fire-related research to meet the varied needs of the land management community and to understand the role of fire on the landscape; this research includes fire management support, studies of post-fire effects, and a wide range of studies on fire history and ecology. USGS is an active participant in the U.S. Department of Agriculture (USDA)/Department of the Interior (DOI) National Fire Plan, which is a long-term effort focused on helping to protect communities and natural resources. The USGS is also an active participant in the DOI and USDA Joint Fire Science Program; a partnership that develops information and tools for managers and specialists who deal with wildland fuels management issues. The Program was authorized and funded by Congress in October 1997. The USGS is using its unique capabilities to investigate the complex interactions of Earth processes with the urban environment in Southern California.

My statement will describe the role of USGS in post fire recovery and rehabilitation in Southern California. Before I begin, however, I have been asked to convey the gratitude of the Department of the Interior to Chairman Pombo and the other members of this Committee for their hard work in achieving the passage of H.R. 1904, the Healthy Forests Restoration Act of 2003. As you know, the President signed that bill on Wednesday. The Department is grateful to you for your efforts in providing, through this legislation, the additional tools needed to carry out the President's Healthy Forests Initiative, and the Department looks forward to making progress in ongoing efforts to address the problems of wildland fires here in California and elsewhere throughout the Country.

The recent fires in Ventura, San Bernardino and San Diego counties were devastating in their reach. However, the damage from this year's wildfires in Southern California is likely not complete. Just as the fires were the largest in southern California's recorded history, the potential for floods and debris flows from the ravaged mountains is great. Storm water run-off in hundreds of drainages in extremely steep terrain with histories of large floods and debris flows will flow into some of the most rapidly growing urban areas of California. Thousands more homes could potentially be destroyed this winter as an indirect impact of the wildfires. Understanding the factors controlling the behavior of wildfires and the potential debris flows that are the indirect consequence of these fires will lead to improved predictive capabilities, helping to plan accurately for and mitigate fire and related hazards in future years and for future generations.

Employing existing data

We have been studying the natural processes of Southern California, in many cases for decades, and thus have baseline data from which we can understand the changes brought about by the fires.

Currently, extensive baseline data exists for two of the focal fire areas.

• San Diego Basin. The Sweetwater River System in the San Diego Basin consists of the Sweetwater River itself, and two receiving reservoirs that are used for drinking water supply (Loveland and Sweetwater Reservoirs). This system is the primary water supply for one million people, and has been heavily impacted by the Cedar fire. The USGS has been conducting atmospheric deposition and dissolved organic carbon studies on Sweetwater and Loveland Reservoirs for the past five years, and has also been conducting surface-water/ground-water interaction studies focused on the impact of pumping on riparian zones that support endangered species. These studies provide excellent data on pre-fire baseline conditions. This work will continue to document and study the effects of atmospheric fallout and runoff from fires on a water body used for drinking water. It is expected that the fire will increase levels of dissolved organic carbon, which will in turn increase concentrations of THMs (tri-halomethanes) when that water is chlorinated for public supply. If chemical indicators of the fire can be found, they will enable tracking of ground-water recharge from the fire areas through the alluvial/riparian system, providing accurate estimates of travel time. This will assist in providing the data necessary to help insure human health while protecting endangered species in the watershed.

• Santa Ana River Basin. Large parts of the Santa Ana River Basin were burned by the Old Fire and the Grand Prix Fire. The USGS has been conducting water-quality studies in the Santa Ana River Basin as part of the National Water Quality Assessment (NAWQA) program and several cooperative studies. These data can be used to assess the impact of the fires on water quality. Water-quality data are available from 7 mountain drainages, six of which were extensively burned. The seventh, the South Fork of the Santa Ana River was not burned and will serve as a control—although it received large amounts of atmospheric fallout. Existing data at these sites include general minerals, nutrients, dissolved organic carbon (DOC), and at selected sites, trace metals, pesticides, and semi-volatile organic carbon compounds. The NAWQA sites are strategically located to study the effects of the fire. The data will be collected bimonthly at three of the sites for a limited suite of constituents. Ten years of water-quality data also are available for downstream sites along the Santa Ana River where water is diverted to ponds that recharge aquifers pumped for water supply for more than 2 million people. Existing data include nutrients, trace elements, pesticides, and selected volatile organic carbon compounds. The study is ongoing and three stormflows will be sampled this year for nutrients, DOC concentrations and extensive characterization of the DOC using optical properties. Additional analyses are needed to characterize the effect of the fires. Ash and other material washed from the basin during stormflow will accumulate in ponds used to recharge aquifers underlying Orange County.

In addition, since 1995, the USGS has been conducting wildlife research in many of the areas impacted by the recent fires, including reptile and amphibian surveys at fixed monitoring stations throughout Southern California. We knew that it was important to understand the response of the natural systems in Southern California to urbanization, and we have learned that Southern California is an ecosystem at great risk of biodiversity loss. The USGS is studying the impact of fire on endangered species and biodiversity in general and the recovery of vegetation in these ecosystems. The USGS research at the various sites has included species diversity and abundance, as well as habitat quality assessments and vegetation characteristics. Invasive plants and fire create substantial challenges for land managers. Invasive plants can compete with native plants, alter wildlife habitat, and promote the spread of fire. Invasive alien grasses especially benefit from fire, promote recurrent fire, in many cases to the point where native species cannot persist and native plant assemblages are converted to annual grasslands. This vegetation type-conversion can affect wildlife and reduce overall biodiversity. The effective management of many wildlife species depends on the control of invasive plants and the maintenance of appropriate fire regimes.

Collecting data for future management decisions

In spite of the tragedy of the recent Southern California fires, we have an unprecedented opportunity to collect data necessary for the effective mitigation of future events. The information collected in the burned areas can be transferable to most of the susceptible fire areas of Southern California. The USGS currently is working with land management and emergency response agencies to develop plans for assessment of hazards from floods and debris flows and for monitoring environmental recovery. This is in addition to mapping the area using remote sensing data as discussed more fully below.

The USGS is currently moving quickly to collect transitory data that will be destroyed over the next few weeks and months, including the effect of the fires on endangered species, the ecosystem causes and consequences of the fires (effect of fire suppression policies, re-growth, burn intensity, etc.), ground water and sediment pollution caused by the fire, the impact of the fires of the adjacent ocean, and “opportunistic” data (unique data acquisition opportunities created by the removal of vegetation, such as unique ‘bare earth’

images along especially hazardous sections of the San Andreas fault). Analysis of these data will support restoration and mitigation plans of the burned lands, many of which are Federal lands managed by the Department of Interior.

This collection of transitory data is accompanied by activities to address immediate information needs for flood warning. The USGS is conducting reconnaissance field inspections of burned watersheds and has begun installation of a limited number of rain and stream gages in critical hazard areas. The USGS is meeting with the National Weather Service and Flood Control agencies to plan expanded ALERT flood warning sites. To assess the hazard from debris flows, the USGS has begun modeling necessary to produce Debris Flow Hazard maps of the most dangerous burn areas and is working on plans, with the support of FEMA, to complete hazard maps for all fire areas. Assessments of debris flow hazards will be shared with landowners and relevant agencies, including Bureau of Land Management, Bureau of Reclamation and the US Forest Service. The USGS is already working with the US Forest Service and others in advising Burned Area Emergency Response (BAER) teams in the affected area.

As water quality can be diminished by sediment transported from the burned watersheds, the USGS is working with baseline from past studies and collecting more data. Recent wildland fires in Southern California have produced ash and a variety of chemicals that enter the air, soil, ground-water and surface-water systems. The tracking of these chemicals through the water system is critical for maintaining a healthy water system, but it will also provide for understanding the larger picture of ground-water pollution in southern California. Specifically, the USGS will continue with a previously planned monitoring experiment to determine the effects of winter floods on sediment and contaminant transport offshore of the mouth of the Santa Ana River.

As noted above, in order to assess the environmental response to the fires, the USGS is evaluating data from previous studies to identify useful pre-fire information that will serve as a baseline to assess fire impacts and monitor post fire recovery, including species inventories and habitat quality assessment, water quality assessments, and vegetation characterization. The USGS has begun field surveys to assess impacts on endangered species that it already was monitoring.

The USGS is also employing its remote sensing expertise to the fire aftermath. Fire response has a need for detailed imagery of the burn areas, both for research and on-the-ground response activities. The USGS is working with other agencies on the post fire response, and examples of imagery that would be used include: a) High-resolution digital topographic mapping; b) Aerial photography; c) Satellite Synthetic Aperture Radar; and d) Multi- and Hyper-spectral imagery. To meet common geographic data needs, the USGS is assessing the availability of relevant remote sensed imagery and data from all agency sources.

Conclusion

USGS scientists have been studying the natural processes discussed in my testimony in southern California for decades, and thus have the baseline data from which we can understand the changes brought about by the fires. The USGS has the scientific expertise in wildland fire research to help in understanding the ecosystems affected by wildfire, and to assist land managers in post-fire recovery and rehabilitation in Southern California.

Mr. Chairman, this concludes my remarks. I, and my colleague, Dr. Jon E. Keeley, USGS, Research Scientist, will be pleased to answer any questions you may have.